Math 212
Requiz 19B

F 04 Nov / N 06 Nov

Your name: _____

Exercise

(5 pt) Find the point closest to the origin on the curve in $\mathbf{R}^3$ given by the intersection of the cone C and the plane H given by

$$C : z^2 = x^2 + y^2, \qquad H : x - 2z = 3.$$

To do this, let's view this as a Lagrange optimization problem with two constraints.

(a) (0.5 pt) Write the function that we seek to optimize. *Hint:* If it simplifies things, argue that we can optimize its square instead.

(b) (1 pt) Write the Lagrangian $L(x, y, z, \mu_1, \mu_2)$. *Hint:* This involves the function in (a) and the two constraints.

(c) (2 pt) Write the first-order conditions. *Hint:* There are five, coming from ∇L.

(d) (1.5 pt) Show that the point that we seek is $(1, 0, -1)$. That is, solve the system of equations in (c). *Hint:* You should find two solutions. Argue why $(1, 0, -1)$ is the one that we want.